

July 1966

Brief 66-10322

NASA TECH BRIEF



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Valve Seat Pores Sealed with Thermosetting Monomer

The problem:

To provide a hard, wear and corrosion resistant valve seating surface on a cast aluminum alloy valve body. The fine finish required on the valve seat is susceptible to handling damage as well as to damage from foreign particles during operation. Corrosion products form on the critical seating surface of the casting after extended exposure to high humidity at elevated temperatures. These corrosion products interfere with proper seating of the valve element and cause leakage.

The solution:

A hard anodic coating provides a smooth wear resistant surface. Vacuum impregnation with a thermosetting monomer, diallyl phthalate, seals the pores on the anodic coating to prevent galvanic corrosion.

How it's done:

The seat area is machined and lapped to the proper configuration and finish. A hard anodized coating approximately 0.002-inch thick is applied to the seat area itself as well as to surfaces immediately adjacent to the seat. To apply the impregnating monomer, the part first is exposed to a maximum absolute pressure of one millimeter of mercury. This effectively removes any moisture and entrapped gases that may exist in the pores of the anodized coating. The impregnating

solution then is forced into the pores under a pressure of 100 psi at approximately 200° F. The surface is then washed lightly in a suitable solvent to remove excess material. A final curing process at approximately 285° F sets the resin.

Notes:

1. A final lapping process to remove the slight film of resin is usually required for good seat leakage characteristics. Removal of this thin film does not impair corrosion resistance since the pores remain impregnated.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama, 35812
Reference: B66-10322

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Arthur B. Olmore
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center
(M-FS-900)

Category 03